The Invention Claimed Is

1. A connector for use in connecting an end of a tubular graft conduit to a side wall of a patient's existing tubular body conduit via an aperture in the side wall thereof, comprising:

a first plurality of fingers configured to engage an interior surface of the side wall of the existing conduit;

a second plurality of fingers configured to engage an exterior surface of the side wall of the existing conduit;

a third plurality of fingers received in an interior lumen of the graft conduit; and

a fourth plurality of fingers configured to pierce the graft conduit,

wherein the connector is radially deformable between a first size and a second size.

2. The connector defined in claim 1, wherein the pluralities of fingers are substantially radially aligned with respect to a longitudinal axis.

3. The connector defined in claim 1, wherein one of the fourth plurality of fingers has a barbed end portion.

4. The connector defined in claim 1, wherein one of the fourth plurality of fingers has a narrow neck portion between a pair of shoulder portions for retaining a portion of the graft conduit between the shoulder portions.

5. The connector defined in claim 1, wherein a pair consisting of adjacent ones of the first and second pluralities of fingers defines a

substantially "U"-shaped configuration when viewed from a plane extending radially out from a longitudinal axis.

6. The connector defined in claim 1, wherein the pluralities of fingers are resilient.

7. The connector defined in claim 1, wherein the first and second pluralities of fingers are resiliently deformable towards parallelism with a longitudinal axis of the connector.

8. The connector defined in claim 1, wherein the connector further comprises:

a plurality of members, each extending from respective ones of the second plurality of fingers and forming an engagement hook.

9. The connector defined in claim 1, wherein the connector is fabricated from nitinol.

10. A graft assembly comprising:

a tubular graft conduit;

a connector defined in claim 1 coaxially connected to an end portion of the tubular graft conduit.

11. The graft assembly defined in claim 10, wherein the tubular graft conduit is positioned in a radially flared configuration by the connector.

12. A graft installing assembly comprising:

the graft assembly as defined in claim 10; and

a delivery structure extending substantially coaxially around the graft assembly, wherein the first and second pluralities of fingers are deflected inwardly toward parallelism with a longitudinal axis of the connector.

13. The graft installing assembly defined in claim 12, wherein the delivery structure includes a collar configured to releasably deflect the first and second pluralities of fingers inwardly toward parallelism with the longitudinal axis.

14. The graft installing assembly defined in claim 13, wherein the delivery structure is movable relative to the connector in order to shift a portion of the collar out of engagement with the first and second pluralities of fingers and thereby release the fingers to extend substantially radially outward.

15. The graft installing assembly defined in claim 12, wherein the delivery structure includes a substantially conical tip extending distally longitudinally from the pluralities of fingers and configured for entry into the aperture in the existing body conduit.

16. The graft installing assembly defined in claim 15, wherein the conical tip at least partially surrounds one of the first and second plurality of fingers.

17. The graft installing assembly defined in claim 12, wherein the delivery structure includes a collar configured to releasably maintain the connector in the second radial size.

18. The graft installing assembly defined in claim 17, wherein the delivery structure is movable relative to the connector in order to shift a portion of the collar out of engagement with the connector and thereby release the connector to elastically return to the first size.

19. The graft installing assembly defined in claim 12 wherein the delivery structure is configured for coaxial deployment through and along the lumen of the tubular body conduit.

20. The graft installing assembly defined in claim 19, wherein a portion of the delivery structure is flexible.

21. A connector for use in connecting an end of a tubular graft conduit to a side wall of a patient's existing tubular body conduit via an aperture in the side wall thereof, comprising:

a first plurality of fingers configured to engage an interior surface of the side wall of the existing conduit;

a second plurality of fingers configured to engage an exterior surface of the side wall of the existing conduit,

wherein the pluralities of fingers are substantially radially aligned with respect to a longitudinal axis and the connector is radially deformable between a first size and a second size.

22. The connector defined in claim 21, wherein the connector is an integral unit.

23. The connector defined in claim 21, further comprising:

a third plurality of fingers configured to pierce the graft conduit.

24. The connector defined in claim 23, wherein one of the third plurality of fingers has a barbed end portion.

25. The connector defined in claim 23, wherein one of the third plurality of fingers has a narrow neck portion between a pair of shoulder portions for retaining a portion of the graft conduit between said shoulder portions.

26. The connector defined in claim 21, wherein one of the first plurality of fingers is provided with a sharpened end portion for piercing the graft conduit.

27. The connector defined in claim 21, wherein a pair consisting of adjacent ones of the first and second pluralities of fingers defines a substantially "U"-shaped configuration when viewed from a plane extending radially out the longitudinal axis of the connector.

28. The connector defined in claim 21, wherein the pluralities of fingers are resilient.

29. The connector defined in claim 21, wherein the first and second pluralities of fingers are resiliently deformable towards parallelism with the longitudinal axis of the connector.

30. The connector defined in claim 21, wherein the connector further comprises:

a third plurality of members each forming an engagement hook.

31. The connector defined in claim 21, wherein one of the second plurality of fingers is resiliently biased to a first angle with respect to a longitudinal axis of the connector.

32. The connector defined in claim 31, wherein one of the second plurality of fingers is configured for deflection to a second angle with respect to a longitudinal axis of the connector.

33. The connector defined in claim 32, wherein one of the second plurality of fingers has a camming surface configured to engage a surface such that axial movement of the connector with respect to the surface causes the finger to move between the first angle and the second angle.

34. The connector defined in claim 31, wherein one of the fourth plurality of fingers has an atraumatic configuration.

35. The connector defined in claim 34, wherein the atraumatic configuration is a curved portion.

36. A graft assembly comprising:
a tubular graft conduit;
a connector defined in claim 21
coaxially connected to an end portion of the tubular graft conduit.

37. The graft assembly defined in claim 36, wherein the tubular graft conduit is positioned in a radially flared configuration by the connector.

38. A graft installing assembly comprising:

the graft assembly as defined in claim 36; and

a delivery structure extending substantially coaxially around the graft assembly, wherein the first and second pluralities of fingers are deflected inwardly toward parallelism with a longitudinal axis of the connector.

39. The graft installing assembly defined in claim 38, wherein the delivery structure includes a collar configured to releasably deflect the first and second pluralities of fingers inwardly toward parallelism with the longitudinal axis.

40. The graft installing assembly defined in claim 39, wherein the delivery structure is movable relative to the connector in order to shift a portion of the collar out of engagement with the first and second pluralities of fingers and thereby release the fingers to extend substantially radially outward.

41. The graft installing assembly defined in claim 38, wherein the delivery structure includes a substantially conical tip extending distally longitudinally from the pluralities of fingers and configured for entry into the aperture in the existing body conduit.

42. The graft installing assembly defined in claim 41, wherein the conical tip at least partially

surrounds one of the first and second pluralities of fingers.

43. The graft installing assembly defined in claim 38, wherein the delivery structure includes a collar configured to releasably maintain the connector in the second radial size.

44. The graft installing assembly defined in claim 43, wherein the delivery structure is movable relative to the connector in order to shift a portion of the collar out of engagement with the connector and thereby release the connector to elastically return to the first size.

45. The graft installing assembly defined in claim 38, wherein the delivery structure is configured for coaxial deployment through and along the lumen of the tubular body conduit.

46. The graft installing assembly defined in claim 45, wherein a portion of the delivery structure is flexible.

47. A connector for use in connecting an end of a tubular graft conduit to a side wall of a patient's existing tubular body conduit via an aperture in the side wall thereof, comprising:

a first plurality of fingers configured to engage an interior surface of the side wall of the existing conduit;

a second plurality of fingers configured to engage an interior surface of the graft conduit and to radially expand the end portion graft conduit adjacent the existing conduit to a dimension greater

than the aperture in the side wall of the existing conduit; and

a third plurality of fingers configured to pierce the end portion of the graft conduit,

wherein the pluralities of fingers are substantially radially aligned with respect to a longitudinal axis and the connector is radially deformable between a first size and a second size.

48. The connector defined in claim 47, wherein the connector is an integral unit.

49. The connector defined in claim 47, wherein one of the third plurality of fingers has barbed end portions.

50. The connector defined in claim 47, wherein one of the third plurality of fingers has a narrow neck portion between a pair of shoulder portions for retaining a portion of the graft conduit between said shoulder portions.

51. The connector defined in claim 47, wherein the pluralities of fingers are resilient.

52. The connector defined in claim 47, wherein the first and second pluralities of fingers are resiliently deformable towards parallelism with the longitudinal axis of the connector.

53. The connector defined in claim 47, further comprising:

a fourth plurality of fingers configured to engage an exterior surface of the side wall of the existing conduit.

54. The connector defined in claim 53, wherein one of the fourth plurality of fingers is resiliently biased to a first angle with respect to a longitudinal axis of the connector.

55. The connector defined in claim 54, wherein one of the fourth plurality of fingers is configured for deflection to a second angle with respect to a longitudinal axis of the connector.

56. The connector defined in claim 55, wherein one of the fourth plurality of fingers has a camming surface configured to engage the existing conduit such that axial movement of the connector with respect to the existing conduit causes the finger to move between the first angle and the second angle.

57. The connector defined in claim 53, wherein one of the fourth plurality of fingers has an atraumatic configuration.

58. The connector defined in claim 57, wherein the atraumatic configuration is a curved portion.

59. A graft assembly comprising:
a tubular graft conduit;
a connector defined in claim 47
coaxially connected to an end portion of the tubular graft conduit

60. The graft assembly defined in claim 53, wherein the tubular graft conduit is positioned in a radially flared configuration.

61. A graft installing assembly comprising:

a graft assembly as defined in claim 59; and

a delivery structure extending substantially coaxially around the graft assembly, whereby the first and second plurality of fingers are deflected inwardly toward parallelism with a longitudinal axis of the connector.

62. The graft installing assembly defined in claim 61, wherein the delivery structure includes a collar configured to releasably deflect the fingers inwardly toward parallelism with the longitudinal axis.

63. The graft installing assembly defined in claim 62 wherein the delivery structure is movable relative to the graft assembly in order to shift a portion of the collar out of engagement with the fingers and thereby release the fingers to extend substantially radially outward.

64. The graft installing assembly defined in claim 61, wherein the delivery structure includes a substantially conical tip extending distally longitudinally from the pluralities of fingers and configured for entry into the aperture in the existing body conduit.

65. The graft installing assembly defined in claim 64, wherein the conical tip at least partially surrounds the first plurality of fingers.

66. The graft installing assembly defined in claim 61, wherein the delivery structure includes a collar configured to releasably maintain the connector in the second radial size.

67. The graft installing assembly defined in claim 66, wherein the delivery structure is movable relative to the connector in order to shift a portion of the collar out of engagement with the connector and thereby release the connector to elastically return to the first size.

68. The graft installing assembly defined in claim 59 wherein the delivery structure is configured for coaxial deployment through and along the lumen of the tubular body conduit.

69. The graft installing assembly defined in claim 68, wherein a portion of the delivery structure is flexible.

70. A method of making a medical graft connector comprising:

providing a tube of an elastic material;

cutting a first axial end portion of the tube at a plurality of locations spaced circumferentially around the first axial end portion to convert the first axial end portion to a first plurality of fingers that extend substantially axially;

cutting a second axial end portion of the tube at a plurality of locations spaced circumferentially around the second axial end portion to convert the second axial end portion to a second and a third plurality of fingers on an alternating configuration and that extend substantially axially;

cutting the medial portion of the tube at a plurality of locations spaced circumferentially around the medial portion with substantially axial "U"-shaped cuts to provide a fourth plurality of fingers that extend substantially axially within the medial portion thereof;

deflecting the fingers radially out from the medial portion; and

setting the fingers as deflected in the deflecting.

71. The method defined in claim 70 wherein the setting comprises:

heat treating the fingers.

72. The method of making a medical graft assembly comprising:

making a medical graft connector by the method defined in claim 70; and

substantially coaxially attaching the medical graft connector to a tubular graft conduit such that at least one of the fingers pierces the graft conduit.

73. The method of making a medical graft assembly comprising:

making a medical graft connector by the method defined in claim 70; and

substantially coaxially attaching the medical graft connector to a tubular graft conduit such that at least one of the fingers is received in an interior lumen of the graft conduit.

74. The method of making an assembly for installing a medical graft comprising:

making a medical graft assembly by the method defined in claim 70; and

substantially coaxially surrounding the medical graft assembly with a delivery structure which elastically deflects the fingers radially inward toward parallelism with a longitudinal axis of the connector.

75. The method of installing a medical graft comprising:

providing an assembly for installing a medical graft by the method defined in claim 74;

inserting the delivery structure through an aperture in a side wall of a patient's tubular body conduit; and

moving the delivery structure relative to the medical graft assembly and the existing tubular body conduit so that the delivery structure is removed from the aperture but the medical graft connector is left extending through the aperture with the fingers again extending substantially radially out from the medial portion inside the tubular body conduit.

76. The method defined in claim 75, wherein the delivery structure is flexible, and wherein the step of inserting the delivery structure includes:

passing the delivery structure intraluminally along a lumen of the patient's existing tubular body conduit; and

passing the delivery structure from within the lumen to outside the existing body conduit.

77. Method for removing a section of a tubular body conduit disposed within a patient for use as a graft conduit, which comprises:

exposing a section of the body conduit;

closing first and second end portions of the body conduit;

closing lateral conduits and severing the lateral conduits downstream from the closing point;

inserting a distal end portion of a catheter into the conduit though an incision adjacent the first end portion of the body conduit;

advancing the distal end portion of the catheter to a location adjacent the second end portion of the body conduit;

cutting the body conduit at a location between the distal end of the catheter and the second end portion of the body conduit at an oblique angle with respect to the longitudinal axis;

cutting the body conduit and the catheter adjacent the incision at a substantially right angle with respect to the longitudinal axis of the body conduit; and

removing the body conduit and the catheter from the patient.

78. Apparatus for connecting an axial end portion of a tubular graft conduit to a side wall of a patient's tubular body conduit via an aperture in that side wall comprising:

connector having a plurality of fingers extending from an axial end of the connector, the fingers being movable between a first configuration wherein the fingers extend radially from the connector to a second configuration wherein the fingers extend substantially axially from the connector;

mandrel sized for insertion into the end of the graft conduit to radially expand the end portion of the graft conduit, the mandrel defining a plurality of openings for receiving the fingers in the second configuration; and

a sleeve configured to surround the connector and tubular conduit and to deflect the fingers toward the second configuration to pierce the flared portion of the graft conduit and be received in the openings.

79. Apparatus defined in claim 78, wherein the fingers are configured to resiliently return to the first configuration.

80. Method of connecting an axial end portion of a tubular graft conduit to a side wall of a patient's tubular body conduit via an aperture in that side wall comprising:

providing a connector having a plurality of fingers, the fingers being movable between a first configuration wherein the fingers extend radially outward to a second configuration wherein the fingers extend substantially axially;

expanding an axial end portion of the graft conduit to a radially flared configuration;

piercing the flared end portion of the graft conduit with the fingers from an outer surface of the graft to an inner surface of the graft while maintaining the fingers in the second configuration; and

allowing the fingers to return to the first configuration such that the end portion of the graft conduit is maintained in the radially flared configuration.

81. The method defined in claim 80, further comprising:

providing a mandrel sized for insertion into the axial end of the graft conduit to radially flare the end portion of the graft conduit,

wherein expanding the end portion of the graft comprises inserting the mandrel into the end of the graft conduit such that the end portion of the graft conduit expands to the flared configuration.

82. The method defined in claim 77, further comprising:

providing a sleeve configured to surround the connector and graft conduit and sized to deflect the resilient fingers toward the second configuration,

before piercing the end portion of the graft conduit with the resilient fingers, surrounding the connector with the sleeve to maintain the resilient fingers in the second configuration.